The rhizomes of *Alepidea amatymbica* and *A. natalensis* are used for colds, coughs, asthma and abdominal cramp in traditional medicine. Antibacterial (two Gram-positive: *Bacillus subtilis*, *Staphylococcus aureus* and two Gram-negative: *Escherichia coli*, *Klebsiella pneumoniae*), antifungal (*Candida albicans*), anti-inflammatory (COX 1 and 2) and genotoxicity tests (Ames test) were carried out on petroleum ether (PE), dicloromethane (DCM), 80% ethanol (EtOH) and water extracts of the two *Alepedia* species, *A. natalensis* and *A. amatymbica*. Water extracts of *A. natalensis* rhizomes exhibited high activity (MIC values of 0.78 mg/ml) against the four bacterial strains. High activity was also observed in the PE and DCM leaf extract of the same plant against the Gram-positive bacteria. The PE and DCM extracts of *A. amatymbica* rhizomes exhibited the best activity (MIC values of 0.39 mg/ml) against *Bacillus subtilis*. The rest of the extracts showed low activity (MIC values > 1 mg/ml). All the extracts showed activity against *Candida albicans*, with *A. natalensis* leaf extracts exhibiting the highest antifungal activity with MIC values of 0.88, 0.2 and 0.78 mg/ml for PE, DCM and EtOH respectively. The PE and DCM extracts had high COX-1 activity with percentage inhibitions above 70%. Ethanol extracts had inhibition less than 40% for both *A. natalensis* and *A. amatymbica*. All the PE extracts showed higher COX-2 inhibitory activity than for COX-1. PE and DCM extracts both had percentage inhibitions above 70% for both COX-1 and COX-2 inhibition. The Ames test for genotoxity revealed that none of the plant extracts were toxic to the *Salmonella* TA98 tester strain.

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Establishing a tissue culture system to increase secondary metabolite production: Over-expression of geranyl diphosphate synthase to up-regulate production of terpenes in *Salvia stenophylla*

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Salvia stenophylla is known to have medicinal properties that are important in the cure of a number of skin diseases. This is largely due to the presence of essential oils, which are derived from terpenoid synthesis regulated by the enzyme geranyl diphosphate synthase. The study is aimed at improving the levels of secondary compounds of the essential oil produced by this plant by over-expressing the gene coding for geranyl diphosphate synthase using *Agrobacterium* transformation. Such improvements have conservation and economical benefits as they will not only reduce wild harvesting of the plant, but also provide a basis for *in vitro* production of metabolites of interest. Germination in *S. stenophylla* seeds was investigated and seeds were subjected to four different treatments (chemical scarification, smoke extract treatment, smoke extract and scarification). The control was left untreated. Smoke-treated and scarified seeds exhibited a high germination under both dark and light conditions and had similar effect germination ($P > 0.05$). This suggests that *S. stenophylla* seed germination is depended on smoke as a germination cue and the removal of the seed coat. However, a combination of both treatments had no effect on germination ($P < 0.05$). Some of the germinating seeds were used to establish a tissue culture system. Upon establishment of *in vitro* seedlings, *Agrobacterium*-mediated transformation with the AgGPPS2 synthase gene (Burke and Croteau, 2002) was examined using hypocotyl and cotyledon explants. The AgGPPS2 gene was sub-cloned into a pCambia vector and *Agrobacterium tumefaciens* EHA105 transformation was conducted using standard methods. Selection of putative transformants was done using kanamycin-supplemented medium and transformation was tested using PCR analysis.

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Galactomannan production in sugarcane callus

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Sugarcane is an ideal higher plant bioreactor, owing to its large biomass and efficient carbon fixation pathway. Through the application of biotechnology, novel value-adding products can be produced in sugarcane. This study was conducted to determine whether the galactomannan polymer from guar (*Cyamopsis tetragonoloba*) can be produced in sugarcane. The expression of exogenous Mannan Synthase and Galactosyltransferase resulted in sugarcane callus that produce the galactomannan polymer. This research indicates that sugarcane indeed has great potential as a bioreactor for the production of novel products.

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A comparative floristic analysis of peri-urban and rural homegardens in Zululand, South Africa

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The Zulu *muzi* (homegarden) is an indigenous knowledge system. However, there is a widely held notion that gardens of indigenous cultures are spontaneous and disorganized. This reconnaissance survey considered this by comparing peri-urban